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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,441	11/20/2003	Yumin Liu	SYMYX/8DIVCO	2966

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FISH & NEAVE IP GROUP  
ROPES & GRAY LLP  
1251 AVENUE OF THE AMERICAS  
FL C3  
NEW YORK, NY 10020-1105

EXAMINER

NGUYEN, TAM M

ART UNIT PAPER NUMBER

1764

DATE MAILED: 08/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/719,441	<b>Applicant(s)</b> LIU, YUMIN	
	<b>Examiner</b> Tam M. Nguyen	<b>Art Unit</b> 1764	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 108-122 is/are pending in the application.
- 4a) Of the above claim(s) 108 and 117-122 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 109-116 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 25, 2006 has been entered.

### ***Terminal Disclaimer***

The terminal disclaimer filed on April 27, 2006 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,355,854 has been reviewed and is accepted. The terminal disclaimer has been recorded.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 109 is rejected under 35 U.S.C. 102(b) as being anticipated by McCain (U.S. 4,524,236).

McCain discloses an oxydehydrogenation process to convert alkanes (e.g., ethane) to alkenes (e.g., ethylene) by contacting the alkanes, in the presence of oxidizing agent, with a

Art Unit: 1764

catalyst comprising about 0.001 to 1 molar of nickel and a metal such as Nb. The reaction has a selectivity of greater than 50%. Since the reaction has a conversion of greater than 60%, the product would have a concentration of alkenes greater than 10% relative to total moles of hydrocarbon. It is noted that McCain does not specifically disclose that during the oxydehydrogenation, the C2-C4 alkane conversion being at least about 5%. However, McCain teaches that the oxydehydrogenation has a conversion of greater than 60% and the process of McCain is essentially the same as the claimed process. It would be expected that during the oxydehydrogenation, the C2-C4 alkane conversion being at least about 5% as claimed. (See abstract; col. Tables I and II; claims 1-4)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 110-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCain (4,524,236) as applied to claim 109 above, and further in view of either Ramachandran et al. (5,043,461) or Durante et al. (5,439,859).

McCain discloses an oxydehydrogenation process to convert alkanes (e.g., ethane) to alkenes (e.g., ethylene) by contacting the alkanes, in the presence of oxidizing agent, with a catalyst comprising nickel. The reaction has a selectivity of greater than 50%. Since the reaction has a conversion of greater than 60%, the product would have a concentration of alkenes greater than 10% relative to total moles of hydrocarbon. It is noted that McCain does not specifically disclose that during the oxydehydrogenation, the C2-C4 alkane conversion being at least about 5%. However, McCain teaches that the oxydehydrogenation has a conversion of greater than 60% and the process of McCain is essentially the same as the claimed process. It would be expected that during the oxydehydrogenation, the C2-C4 alkane conversion being at least about 5% as claimed. (See abstract; col. Tables 1 and 2)

McCain does not disclose a step of adding or recycling alkene to the reaction zone, does not disclose a second reaction zone, does not disclose a step of controlling the concentration of oxygen in the first and second reaction zones.

Durante and Ramachandran disclose a process for producing alkene by utilizing multiple reaction zones. Ramachandran also teaches a step of recycling alkene back to the oxidation process. (See Durante col. 5, lines 33-35; Ramachandran figs. 5-7; col. 4, lines 6-7))

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of McCain by co-feeding a C<sub>2</sub>-C<sub>4</sub> alkene to the reaction zone as taught by Ramachandran (See Fig. 4-7; col. 4, lines 6-7) because Ramachandran

Art Unit: 1764

discloses that the step of recycling alkene to the reaction zone would increase the overall process efficiency.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of McCain by utilizing a second reaction zone as taught by either Ramachandran or Durante because using an additional reaction zone would improve the over all conversions of the process.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the modified process of McCain by controlling the concentration of oxygen in the first and second reaction zones as claimed because the process of McCain is operated at high conversions and high selectivity as claimed. Therefore, it is within the level of one having ordinary skill in the art to control the concentration of oxygen so that the process is maintained at high conversions and high selectivity.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tam M. Nguyen whose telephone number is (571) 272-1452. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tam M. Nguyen  
Examiner  
Art Unit 1764

TN

A handwritten signature in black ink, appearing to read 'Tam', with a horizontal line underneath it.